Claims

What is claimed is:

1. A damping system for an axle configured to pivot about a pivot point, comprising:

a first hydraulic cylinder connected to the axle on one side of the pivot point and having a first chamber and a second chamber;

a second hydraulic cylinder connected to the axle on the other side of the pivot point and having a third chamber and a fourth chamber;

a first fluid line connecting the first chamber with the fourth chamber;

a second fluid line connecting the second chamber with the third chamber;

a restricted fluid passageway connecting the first fluid line and the second fluid line; and

a valve mechanism disposed between the first fluid line and the second fluid line and operable to release fluid from one of the first and second fluid lines when the pressure of the fluid in the one of the first and second fluid lines reaches a predetermined level.

2. The damping system of claim 1, further including a control mechanism operatively engaged with the valve mechanism to change the predetermined level depending upon operating conditions.

3. The damping system of claim 1, wherein the valve mechanism includes a first pressure relief valve configured to release fluid from the second fluid line to the first fluid line and a second pressure relief valve configured to release fluid from the first fluid line to the second fluid line.

4. The damping system of claim 1, wherein the valve mechanism includes a pressure relief valve in fluid communication with the first and second fluid lines and configured to release fluid to a tank.

5. The damping system of claim 1, wherein the restricted fluid passageway includes a valve having an orifice restricting the rate of fluid flow therethrough.

6. The damping system of claim 5, further including a control mechanism operable to adjust the size of the orifice.

7. A work machine, comprising:

a chassis;

an axle connected to the chassis and configured to pivot about a pivot point;

a first hydraulic cylinder having a housing mounted on the chassis and a rod connected to the axle on one side of the pivot point, the first hydraulic cylinder having a first chamber and a second chamber;

a second hydraulic cylinder having a housing mounted on the chassis and a rod connected to the axle on the other side of the pivot point, the second hydraulic chamber having a third chamber and a fourth chamber;

a first fluid line connecting the first chamber with the fourth chamber;

a second fluid line connecting the second chamber with the third chamber;

a restricted fluid passageway connecting the first fluid line and the second fluid line; and

a valve mechanism disposed between the first fluid line and the second fluid line and operable to release fluid from one of the first and second fluid lines when the pressure of the fluid in the one of the first and second fluid lines reaches a predetermined level.

8. The work machine of claim 7, wherein the valve mechanism includes a first pressure relief valve configured to release fluid from the first fluid line to the second fluid line and a second pressure relief valve configured to release fluid from the second fluid line to the first fluid line.

9. The work machine of claim 7, further including a control mechanism operatively engaged with the valve mechanism to change the predetermined level depending upon operating conditions.

10. The work machine of claim 7, further including a work implement and wherein the control changes the predetermined level based on the elevation of the work implement.

11. The work machine of claim 7, wherein the valve mechanism includes a pressure relief valve in fluid communication with the first and second fluid lines and configured to release fluid to a tank.

12. The work machine of claim 7, wherein the restricted fluid passageway includes a valve having an orifice restricting the rate of fluid flow therethrough.

13. The work machine of claim 12, further including a control mechanism operable to adjust the size of the orifice.

14. The work machine of claim 13, further including a work implement and wherein the control mechanism adjusts the size of the orifice based on the elevation of the work implement.

15. A method of damping an axle, comprising:

connecting a first hydraulic cylinder having a first chamber and a second chamber to one end of the axle;

connecting a second hydraulic cylinder having a third chamber and a fourth chamber to the other end of the axle;

placing the first chamber in fluid communication with the fourth chamber through a first fluid line and the second chamber in fluid communication with the third chamber through a second fluid line;

allowing a restricted flow of fluid between the first fluid line and the second fluid line; and

releasing fluid from one of the first and second fluid lines when the pressure of the fluid in the one of the first and second fluid lines reaches a predetermined pressure level.

16. The method of claim 15, further including the step of adjusting the rate of the restricted flow of fluid based upon operating conditions.

17. The method of claim 16, wherein the rate of the restricted flow of fluid is adjusted based on the elevation of a work implement.

18. The method of claim 15, further including the step of changing the predetermined pressure level based upon operating conditions.

19. The method of claim 18, wherein the predetermined pressure level is changed based on the elevation of a work implement.

20. A damping system for an axle configured to pivot about a pivot point, comprising:

a first hydraulic cylinder connected to the axle on one side of the pivot point and having a first chamber and a second chamber;

a second hydraulic cylinder connected to the axle on the other side of the pivot point and having a third chamber and a fourth chamber;

a first fluid line connecting the first chamber with the fourth chamber;

a second fluid line connecting the second chamber with the third chamber;

a restricted fluid passageway connecting the first fluid line and the second fluid line, the restricted fluid passageway including an adjustable orifice; and

a first pressure relief valve configured to release fluid from the second fluid line to the first fluid line when the pressure of the fluid in the second fluid line reaches a predetermined level;

a second pressure relief valve configured to release fluid from the first second fluid line to the second fluid line when the pressure of the fluid in the first fluid line reaches the predetermined level; and

a control mechanism operatively engaged with the first and second pressure relief valves to change the predetermined level depending upon operating conditions.